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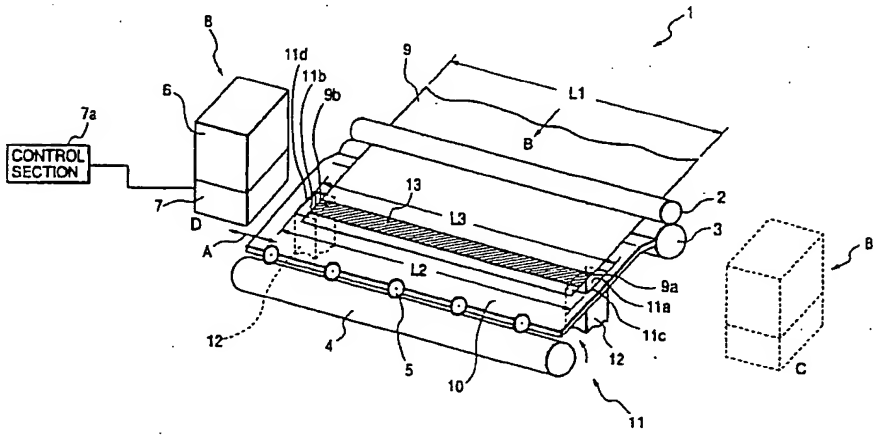
(54) Ink jet recording apparatus and ink jet recording method

(57) An ink jet recording apparatus comprises carrying means for carrying a recording medium; a head installation unit for installing a recording head to record on the recording medium by discharging ink from discharge ports, which reciprocates in the width direction intersecting the carrying direction of the recording medium; supporting means for supporting the recording medium in a position facing the recording head; and opening portions for collecting ink discharged from the recording head at the edges of the recording medium in the width direction. With the structure thus arranged, this ink jet recording apparatus is capable of recording up to the edges of a recording medium in high quality without staining the recording medium.

FIG. 1



EP 1 059 168 A2

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to an ink jet recording apparatus. More particularly, the invention relates to an ink jet recording apparatus provided with the function that performs recording without making marginal portions at the edges of a recording medium. The invention also relates to an ink jet recording method therefor.

Related Background Art

[0002] Conventionally, for example, the ink jet recording apparatus, which records on a paper sheet, cloth, a plastic sheet, an OHP sheet, and other recording media by discharging ink with the pressure exerted by bubbles created when film boiling is generated in ink by the application of heat generated by electrothermal transducing elements, is able to operate recording in high density at high speed. The ink jet recording apparatus is, therefore, utilized and merchandised as output means of information processing systems, such as a printer, among some others.

[0003] Also, for the ink jet recording apparatus, it has been attempted to make the nozzles for discharging ink arranged in a higher density, to make the discharging ink droplets finer, and to promote providing the higher quality that may be comparable with a photograph by the application of technologies that enables ink of different densities to be used or the like. As a result, it becomes possible to market an ink jet recording apparatus even in such a field of image transmission for medical use in which the operation has been carried out by use of a silver salt photograph or the like.

[0004] Generally, an ink jet recording apparatus comprises a carriage having detachably mounted on it a recording head and ink tank that serve as recording means; carrying means for carrying a recording medium; and control means for controlling those means. Then, the recording head that discharges ink from a plurality of discharge ports is arranged, on one hand, to serially scan in the direction (hereinafter referred to as the main scanning direction) orthogonal to the carrying direction (hereinafter referred to as the sub-scanning direction) of a recording medium, and, on the other hand, the recording medium is intermittently carried in the sub-scanning direction at a given pitch at the time of non-recording operation.

[0005] Fig. 17 is a side view which schematically shows the structure of the principal part of the conventional ink jet recording apparatus 203 of the kind. Fig. 18 is a perspective view which schematically shows such ink jet recording apparatus.

[0006] The conventional ink jet recording apparatus 203 comprises the recording medium supply unit 221 that supplies a recording medium 216; the recording unit 222 that performs recording by use of the ink jet recording head cartridge 224 mounted on a carriage (not shown) on the recording medium 216 which has been fed; and the exhaust sheet unit 223 which receives the exhausted recording medium 216 after recording has been made in the recording unit 222.

[0007] Hereunder, the brief description will be made of the operation of the conventional ink jet recording apparatus 203 to record on the recording medium 216.

[0008] A number of recording mediums 216, which are stacked and set on a pressure plate 217, are pressed by the pressure plate 217 to a separation roller 218, and separated one by one by separating means, such as separation nails (not shown), and by use of the separation roller 218. After that, the recording medium thus separated is carried to first sub-scanning rollers 208 and 209 along guide plates 219 and 220. Then, the recording medium 216 is nipped by the first sub-scanning roller 208 and 209 and carried to the recording unit 222 where recording is made with ink discharged from the recording head 212 of the ink jet recording head cartridge 224 having the ink tank 213 and the recording head 212 on it, while the position of the recording medium is regulated by means of the platen plate 215. The ink tank 213 keeps ink in it for its supply to the recording head 212. The recording head 212 is provided with a plurality of discharge ports arranged in the sub-scanning direction (indicated by an arrow K in Fig. 18) which is the carrying direction of the recording medium. 216. Also, in recording, the carriage (not shown) that mounts the ink jet recording head cartridge 224 on it performs the recording by reciprocating in the main scanning direction (indicated by an arrow J in Fig. 18) which orthogonal to the sub-scanning direction, along the carriage guide (not shown) arranged substantially in parallel with the rotational shaft of the sub-scanning roller. After recording, the recording medium 216 is exhausted to the recording medium receptacle 214 while being nipped by the second sub-scanning rollers 210 and 211. The second sub-scanning roller 211 is in the form of spur in order to avoid the adhesion of wet ink, because this roller is in contact with the recording medium immediately after recording.

[0009] In this respect, the carriage has been moved above the predischarging ports 202 before recording, and ink is predischarged so that the recording head 212 is made ready suitable for the performance of good recording. Conventionally, the predischarging ports 202 are arranged outside the carrying path of the recording medium 216 as shown in Fig. 18 so that the recording medium 216 is not allowed to be stained by the ink that adheres to the predischarge ports 202.

[0010] Also, on the recording medium 216, there are formed the recording area 201a where recording is made, and the non-recording areas 201b which become marginal portions where no recording is made as shown

in Fig. 18. If recording is made in the non-recording areas 201b, ink is allowed to adhere to the platen plate 215, and the recording medium 216 is stained. The non-recording areas 201b are formed in order to avoid it.

[0011] However, with the structure of the conventional example described above, there are problems encountered as given below when transmitted images are made for medical use, for example.

[0012] Fig. 19 is a view which shows one example of a transmitted image 204 for medical use where recording is made on a transparent recording medium by use of the conventional ink jet recording apparatus. Also, Fig. 20 is a view which shows the state where transmitted images 204 and 204' are arranged side by side on a light box 205 for observation.

[0013] On the circumference of the image areas 204a, an area, which is called a border 204b, is formed where the areas other than images are smeared with black color in high density. Further, on the circumference of the border 204b, the transparent areas having no recording made on them are formed as the non-recording areas 204c, 204d, 204e, and 204f.

[0014] As shown in Fig. 20, the transmitted image 204 is in a state where the transmitted image 204 is inserted on the upper portion of the front face of the light box 205. Then, the image area 204a is observed by applying the back light to the reverse side of the transmitted image 204 from the light box 205. Therefore, in a case of a silver salt photograph, all the portions other than medical images are treated as the borders. Then, when this photograph is observed on the light box 205, unwanted light is blocked off. This is because intensified light is emitted from the unwanted transparent portions, if any, and the intended observation is hindered on the portions that should be examined precisely.

[0015] Here, the transmitted image 204 which is recorded by use of the conventional ink jet recording apparatus presents the transparent areas 204c, 204d, 204e, and 204f which are formed on the circumference of the border 204b without any recorded images. When a transmitted image 204 of the kind is put on the light box 205 for observation, the light that breaks through the non-recording areas 204d and 204e on both edges, respectively, in particular, hits the eyes of the observer to hinder the precise observation of the image area 204a. Also, as shown in Fig. 20, plural numbers of transmitted images 204 and 204' are often observed at a time. In this case, when each of the image areas 204a and 204a' of the respective transmitted images 204 and 204' is intently observed one after another, such gaze of the observer may shift across the transmitted image 204 and the transmitted image 204'. Then, the eyes of the observer which have gazed upon the weaker luminous energy on the image area are dazzled by the intense light that breaks through the transparent marginal portions of the non-recording areas 204e and 204d', hence making it impossible, in some case, to read out the minute change of luminous energies on the image areas 204a and 204a' to be observed next.

[0016] As an apparatus that may be able to solve the problems discussed above, an ink jet printer is disclosed in the specification of Japanese Patent Application Laid-Open No. 8-169155 wherein on the lower side of the printing head of such printer, there is provided an ink collection container having a sufficient width which is larger than the width of a recording sheet to be carried across the range of the printing head reciprocation.

[0017] Nevertheless, the ink jet printer disclosed in the specification of the aforesaid laid-open application does not provide any guiding members that guide a recording sheet over the entire width of the recording sheet on the lower side of the printing head, and the recording sheet is carried in a state where it floats in the air. As a result, the behavior of the recording sheet is unstable. Further, the behavior of the recording sheet becomes more unstable when the ink droplets discharged from the printing head are absorbed into the recording sheet, hence presenting an unfavorable problem that the quality of recorded images is degraded.

SUMMARY OF THE INVENTION

[0018] It is an object of the present invention to provide an ink jet recording apparatus capable of recording up to the edges of a recording medium in high quality, and also, to provide an ink jet recording method therefor.

[0019] It is another object of the invention to provide an ink jet recording apparatus which comprises carrying means for carrying a recording medium; a head installation unit for a recording head to record on the recording medium by discharging ink from discharge ports, which reciprocates in the width direction intersecting the carrying direction of the recording medium; supporting means for supporting the recording medium in a position facing the recording head; and opening portions for collecting ink discharged from the recording head at the edges of the recording medium in the width direction.

[0020] It is still another object of the invention to provide an ink jet recording apparatus which comprises carrying means for carrying a recording medium in the carrying direction of the recording medium; a head installation unit for mounting the recording head to record on the recording medium, which discharges ink from a plurality of discharge ports arranged in a range exceeding the passage area of the recording medium in the width direction intersecting the carrying direction; supporting means for supporting the recording medium in a position facing the recording head; and opening portions for collecting ink discharged from the recording head at the edges of the recording medium in the width direction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

Fig. 1 is a perspective view which schematically shows the structure of the recording unit of an ink jet recording apparatus in accordance with a first embodiment of the present invention.

Fig. 2 is a view which shows one example of the transmitted image for medical use, which is recorded by the ink jet recording apparatus in accordance with the first embodiment of the present invention.

Fig. 3 is a view which shows the state where plural numbers of transmitted images are arranged side by side for observation by use of a light box.

Fig. 4 is a view which shows one example of a differently configured platen plate.

Fig. 5 is a plan view which schematically shows the structure of an ink jet recording apparatus in accordance with a second embodiment of the present invention.

Fig. 6 is a cross-sectional view which schematically shows the structure of the ink jet recording apparatus represented in Fig. 5.

Fig. 7 is a plan view which schematically shows the structure of an ink jet recording apparatus in accordance with a third embodiment of the present invention.

Fig. 8 is a cross-sectional view which schematically shows the structure of the ink jet recording apparatus represented in Fig. 7.

Fig. 9 is a plan view which schematically shows the structure of an ink jet recording apparatus in accordance with a fourth embodiment of the present invention.

Fig. 10 is a cross-sectional view which schematically shows the structure of the ink jet recording apparatus represented in Fig. 9.

Fig. 11 is a plan view which schematically shows the structure of an ink jet recording apparatus in accordance with a fifth embodiment of the present invention.

Fig. 12 is a cross-sectional view which schematically shows the structure of the ink jet recording apparatus represented in Fig. 11.

Fig. 13 is a cross-sectional view which schematically shows the structure of the ink jet recording apparatus represented in accordance with a sixth embodiment of the present invention.

Fig. 14 is a perspective view which schematically shows the structure of the recording unit of an ink jet recording apparatus in accordance with a seventh embodiment of the present invention.

Fig. 15 is a cross-sectional view which schematically illustrates the state where recording is made on the front end portion of a recording medium by the ink jet recording apparatus shown in Fig. 14.

Fig. 16 is a cross-sectional view which schematically illustrates the state where recording is made on the rear end portion of the recording medium by the ink jet recording apparatus shown in Fig. 14.

Fig. 17 is a side view which schematically illustrates the principal structure of the conventional ink jet recording apparatus.

Fig. 18 is a perspective view which schematically shows the conventional ink jet recording apparatus.

Fig. 19 is a view which shows one example of the transmitted image for medical use, which is recorded by the conventional ink jet recording apparatus.

Fig. 20 is a view which shows the state where plural numbers of transmitted images are arranged side by side for observation by use of a light box in accordance with the conventional art.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] Now, with reference to the accompanying drawings, the description will be made of the embodiments in accordance with the present invention.

(First Embodiment)

[0023] Fig. 1 is a perspective view which schematically shows the structure of the recording unit 19 of an ink jet recording apparatus 1 in accordance with a first embodiment of the present invention.

[0024] The recording unit 19 of the ink jet recording apparatus 1 of the present embodiment comprises a carriage that serves as the head installation unit (not shown) for mounting the ink jet recording head cartridge 8, which is provided with first sub-scanning rollers 2 and 3 and second sub-scanning rollers 4 and 5 to carry the recording medium 9 which is capable of transmitting light, an ink tank 6 and a recording head 7; a platen plate 10 having the ink receiving ports 11a and 11b formed therefor; and a control unit 7a that controls ink discharges from the recording head 7.

[0025] The first sub-scanning rollers 2 and 3 are arranged to nip a recording medium 9 and carries the recording medium 9 onto the upper face of the platen plate 10. The second sub-scanning rollers 4 and 5 are arranged to nip the recording medium 9 after recording, and exhausts it to a recording medium receptacle (not shown). The second sub-scanning roller 5 is in contact with the recording medium 9 immediately after recording. Therefore, this roller is in the form of spur in order to avoid the adhesion of wet ink.

[0026] The ink tank 6 keeps ink in it. The recording head 7 has a plurality of discharge ports formed therefor in the sub-scanning direction (indicated by an arrow B in Fig. 1) which is the carrying direction of the recording medium 9. On recording, the carriage that has the ink jet recording head cartridge 8 mounted thereon is

arranged to reciprocate in the main scanning direction (indicated by an arrow A in Fig. 1) which is orthogonal to the direction that intersects the sub-scanning direction, for example, along the carriage guide (not shown) arranged substantially in parallel with each rotational shaft of the sub-scanning rollers. The recording head 7 performs recording while reciprocating between the position C indicated by solid line in Fig. 1 and the position D indicated by broken line in it. Also, The ink jet recording head cartridge 8 is capable of discharging ink in the range L_3 where ink is discharged, which is wider than the range L_1 between the right edge 9a and left edge 9b of the recording medium 9.

[0027] The two ink receiving ports 11a and 11b formed for the platen plate 10 are communicated with an ink absorbent or an ink tank (not shown) that stores unwanted ink by way of a tube 12. Also, the positions where the ink receiving ports 11a and 11b are formed are directly below the passage of the recording head 7. At the same time, it is arrange to make the gap L_2, which is between the outer side end 11c, namely, the outer edge of the ink receiving port 11a and the outer end 11d, namely, the outer edge of the ink receiving port 11b, wider than the range L_3 where ink is discharged. In other words, the relationship between the width L_1 of the recording medium 9, the gap L_2 between the outer edge 11c and the outer edge 11d, and the ink discharging range L_3 is as follows:

$$L_1 < L_3 < L_2$$

Then, the formation is made so that the ink receiving port 11a corresponds to the right edge 9a of the recording medium 9, while the ink receiving port 11b corresponds to the left edge 9b of the recording medium 9.

[0028] Now, the detailed description will be made of a method for recording on the recording medium 9 by use of the ink jet recording apparatus 1 in accordance with the present embodiment.

[0029] Here, the description relates to the case where the border 13 is recorded on the recording medium 9, while the carriage having the ink jet recording head cartridge 8 mounted thereon moves from the position C to the position D.

[0030] The recording medium 9 is nipped by the first sub-scanning rollers 2 and 3 and carried onto the upper face of the platen plate 10.

[0031] The carriage moves from the position C to the position where the ink receiving port 11a is located. Then, the recording head 7 begins discharging ink in accordance with the controlling signals from the control unit 7a when the head arrives in a location within the projected position of the ink receiving port 11a, but the discharge ports of the recording head 7 are yet to reach the protected position of the recording medium 9. In other words, when the recording head 7 comes into the range L_3 in Fig. 1, ink begins to be discharged to the ink receiving port 11a. This means that ink is discharged to the area outside the recording medium 9. However, the ink thus discharged outside the recording medium 9 is collected by the ink receiving port 11a so that the platen plate 10 is not stained. The recording medium 9 which is carried on the platen plate 10 is not stained, either. Also, the ink that has been discharged at this juncture is exhausted to the ink absorbent or the ink tank that stores unwanted ink through the tube 12.

[0032] The carriage further moves to the position D while discharging ink continuously from the recording head 7 in accordance with the control signals from the control unit 7a. In this manner, the recording of the border 13 begins with the right edge 9a without the formation of the non-recording area on the recording medium 9. Then, the carriage passes the left edge 9b of the recording medium 9, while the recording head 7 discharges ink to record the border 13 on the recording medium 9. and the ink discharges are performed up to the outer edge 11d of the ink receiving port 11b. In this way, it becomes possible to eliminate the formation of the non-recording area on the left edge 9b of the recording medium 9. Thus, each border 13 is formed on the edges of the recording medium 9 without the formation of the non-recording areas on them.

[0033] After recording the borders 13, the recording head 7 terminates ink discharges within the range of L_3 in Fig. 1 before the discharge ports arrive at the outer edge 11d of the ink receiving port 11b. Therefore, there is no possibility that the platen plate 10 is stained by the discharged ink. Also, the ink that has been discharged then is exhausted to the ink absorbent or to the ink tank that stores unwanted ink through the tube 12.

[0034] Fig. 2 is a view which shows one example of the transmitted image 14 for medical use, which is recorded by the ink jet recording apparatus 1 in accordance with the present embodiment.

[0035] On the area other than the image area 14a, the border 14b is formed with black color smeared in high density. Here, whereas the transmitted image 204 recorded by the conventional ink jet recording apparatus shown in Fig. 19 has non-recording areas 204c, 204d, 204e, and 204f each on the upper, lower, left, and right edges, respectively, the transmitted image 14 formed by the ink jet recording apparatus 1 of the present embodiment has each of the non-recording areas 14c and 14d only on the upper and lower edges. Then, on the left and right edges, the borders 14b are formed, respectively, to be smeared entirely with black color.

[0036] Fig. 3 is a view which shows the state where a transmitted image 14a and a transmitted image 14a' which is formed in the same way as the transmitted image 14a are arranged side by side for observation by use of a light box 5.

[0037] Since there is no transparent portions on the left and right edges of the transmitted image 14a and the transmitted image 14a', no gap is formed between the transmitted images 14a and 14a', which may allow

the back light to pass from the light box 5 as it is.

[0038] In this respect, the description has been made of the platen plate 10 in accordance with the flat plate type as one example. However, the platen plate is not necessarily limited thereto. It may be possible to use the one which is configured as the platen plate 16 shown in Fig. 4, for example.

[0039] In other words, the width L_4 of the contact surface 16a of the platen plate 16, which is in contact with the recording medium 9, is formed narrower than the width L_1 of the recording medium 9. Also, both ends of the platen plate 16 are provided with the stepping portions 16b and 16c which are in the shape to present steps below the contact surface 16a. The relationship between the L_1, L_3, L_2, and L_4 is as follows:

$$L_4 < L_1 < L_3 < L_2$$

where the platen plate 16 is used. With the stepping portions 16b and 16c being positioned below the contact surface 16a, there is no possibility that these portions are in contact with the recording medium 9. Also, the ink receiving ports 17a and 17b are formed for the stepping portions 16b and 16c, respectively, but the recording medium 9 is not stained when the recording medium 9 is in contact with the left and right edges even if the ink receiving ports 17a and 17b are stained with ink, because the stepping portions 16b and 16c are not in contact with the recording medium 9 as described above.

[0040] Here, it may also be possible to use a plate member provided with linear extrusions or an embossed plate member, besides the one which is configured to be the platen plate 10 or 16.

[0041] As has been described above, the ink jet recording apparatus 1 of the present embodiment is provided with the ink receiving ports 17a and 17b which are formed for the platen plate 10 corresponding to each of the left and right edges of the recording medium 9, and ink begins to be discharged immediately before the recording head 7 arrives at the right edge of the recording medium 9. Then, ink is continuously discharged until the recording head 7 passed the left edge of the recording medium 9. Therefore, it becomes possible to form the borders 13 each on the left and right edges of the recording medium 9, which are all smeared out. As a result, even when a plurality of transmitted images 14 recorded by the ink jet recording apparatus 1 of the present embodiment are arranged side by side on the light box 15, it becomes possible for the observer to read out the minute change of luminous energies on the image areas without being dazzled by the intensive light that breaks through the transparent marginal portions formed by the non-recording areas even if his eyes pass across the transmitted images, while he is engaged in gazing each of the image areas 14a of each transmitted image 14 one after another.

(Second Embodiment)

[0042] Now, Fig. 5 and Fig. 6 are views which illustrate the structure of the recording unit 59 of an ink jet recording apparatus 40 schematically in accordance with a second embodiment of the present invention. Fig. 5 is a plan view and Fig. 6 is a cross-sectional view, respectively.

[0043] For the platen plate 44 of the ink jet recording apparatus 40 of the present embodiment, there are formed a first ink receiving port 44a on a position corresponding to the right edge 41b of each recording medium which is in a different width, and which has been carried to that position; a second ink receiving port 44b on a position corresponding to the left edge of each recording medium in a different width; likewise, a third ink receiving port 44c; and a fourth ink receiving port 44d.

[0044] The second ink receiving port 44b on the position that corresponds to the left edge 41a of the first recording medium 41. The third ink receiving port 44c on the position that corresponds to the left edge 42a of a second recording medium 42 which is wider than the first recording medium 41. The fourth ink receiving port 44d corresponds to the left edge 43a of a third recording medium 43 which is wider than the second recording medium 42.

[0045] Also, each of the ink receiving ports is communicated with each of the tubes 55. Then, between each ink receiving port and each tube 55, a recessed portion 48 is formed on the surface of the platen plate 44. With the recessed portions 48 thus formed, it is possible to control the adhesion of unwanted ink to each recording medium to be used.

[0046] Below the platen plate 44, an ink absorbent case 45 is arranged to contain an ink absorbent 47, thus absorbing and retaining the ink which has flown in through each tube 55 extruded into each of the ink receiving ports. The ink absorbent case 45 is provided with a cover 46 so as not to allow the absorbed ink to leak out.

[0047] In this respect, the ink absorbent or the ink tank that stores unwanted ink, which is not shown as representation of the first embodiment, is the one which is the same as the ink absorbent case 45 with the cover 46 that contains the ink absorbent 47 as shown in Fig. 6.

[0048] With the structure thus arranged, the first recording medium 41 that has been carried by use of the first sub-scanning rollers 49 and 50 is provided with the borders 53 each on the left and right edges thereof smeared with black ink discharged from the recording head 56 of the ink jet recording head cartridge 54 in high density without any marginal portions thereon. In this case, the range of ink discharged from the recording head 56 is between the first ink receiving port 44a and the second ink receiving port 44b, and there is no possibility that the platen plate 44 and the first recording medium 41 are stained.

[0049] Likewise, when recording is performed on the second recording medium 42, the range of ink discharged from the recording head 56 is between the first ink receiving port 44a and the third ink receiving port 44c. When recording is performed on the third recording medium 43, the range of ink discharged from the recording head 56 is between the first ink receiving port 44a and the fourth ink receiving port 44d. As a result, there is no possibility in any case that the platen plate 44, the second recording medium 42, and the third recording medium 43 are stained.

[0050] The structure and operation of the ink jet recording apparatus 40 of the present embodiment are fundamentally the same as those of the ink jet recording apparatus 1 described in the first embodiment with the exception of what has been described so far. Here, therefore, the detailed description thereof will be omitted.

[0051] Further, in this respect, the description has been made of the platen plate 44 exemplifying the one which is the flat plate type. However, the platen plate is not necessarily limited thereto. It may be possible to arrange each portion of the ink receiving ports to be configured not to be in contact with each recording medium to be used. For example, a plate member having linear extrusions or an embossed plate member may be adoptable.

[0052] As described above, it is possible for the ink jet recording apparatus 40 of the present embodiment to record without forming any marginal portions each on the left and right edges of each recording medium as in the case of the ink jet recording apparatus of the first embodiment.

(Third Embodiment)

[0053] Now, Fig. 7 and Fig. 8 are views which illustrate the structure of the recording unit 69 of an ink jet recording apparatus 60 schematically in accordance with a third embodiment of the present invention. Fig. 7 is a plan view and Fig. 8 is a cross-sectional view, respectively.

[0054] The platen plate of the ink jet recording apparatus 60 of the present embodiment is not the flat type like the platen plate 44 used for the ink jet recording apparatus 40 of the second embodiment. For this platen plate, a plurality of thin wire-like bars 62 are arranged in parallel in the main scanning direction assuming that the sub-scanning direction is the longitudinal direction. Also, each of the bars 62 is arranged so as not to intervene in each of the ink receiving ports 61 which will be described later. Each of the ink receiving ports 61 is tapered with the wider sectional area at its opening than the sectional area of the tube 63. With this configuration, it becomes easier to collect the ink which has been discharged in the air. Also, each of the opening edge of the ink receiving ports 61 is positioned lower than that of each bar 62. As a result, there is no possibility that the recording medium 64 and each opening edge of the ink receiving ports 61 are in contact with each other.

[0055] The structure and operation of the ink jet recording apparatus 60 of the present embodiment are fundamentally the same as those of the ink jet recording apparatus 40 described in the second embodiment with the exception of what has been described so far. Here, therefore, the detailed description thereof will be omitted.

[0056] As described above, not only the ink jet recording apparatus 60 of the present embodiment has a lesser amount of area in which it is in contact with a recording medium, but also, this apparatus can support each recording medium with the bars 62 each having a lesser amount of area of possible ink adhesion. Therefore, it becomes possible to record without forming any marginal portions each on the left and right edges of each recording medium as in the case of the ink jet recording apparatus of the first and second embodiments.

(Fourth Embodiment)

[0057] Now, Fig. 9 and Fig. 10 are views which illustrate the structure of the recording unit 89 of an ink jet recording apparatus 70 schematically in accordance with a fourth embodiment of the present invention. Fig. 9 is a plan view and Fig. 10 is a cross-sectional view, respectively.

[0058] The ink jet recording apparatus 70 of the present embodiment is provided with the ink receiving port 75 having an ink receiving opening formed therefor, which is connected by a rod 74 with a second positioning plate 73 arranged corresponding to a first positioning plate 72 that regulates the right edge 71b of each recording medium. The second positioning plate 73 moves in parallel in the main scanning direction. This plate is made freely fixable in order to conduct the positional regulation of the left edge of each recording medium. The ink receiving port 75 which is connected by the rod 74 with the second positioning plate 73 is of course movable in the main scanning direction along with the second positioning plate 73.

[0059] For the cover 78 of the ink absorbent case 77 that contains the ink absorbent 76, an opening 78a is formed corresponding to the movable range of the ink receiving port 75. In other words, the opening 78a is formed so that the collected ink, which has fallen off from the tube 75a communicated with the ink receiving port 75, can flow into the ink absorbent 76 in the ink absorbent case 77 irrespective of the position in which the ink receiving port 75 is set within the movable range of the ink receiving port 75.

[0060] Now, hereunder, the description will be made of the procedures to set the ink receiving port 75 corresponding to each size of the recording medium to be used.

[0061] When a border 81 is formed on a first record-

ing medium 71, the operator shifts the second positioning plate 73 to a position equal to the left edge 71a of the first recording medium. Then, the ink receiving port 75 connected by the rod 74 is set at the position (designated by a reference mark G in Fig. 9) that corresponds to the left edge 71a of the first recording medium.

[0062] Likewise, when recording is made on a second recording medium 79 which is wider than the first recording medium 71, the operator shifts the second positioning plate 73 to the position equal to the left edge 79a of the recording medium. Thus, the ink receiving port 75 is set at the position (at H in Fig. 9) that corresponds to the left edge 79a of the second recording medium.

[0063] When recording is made on a third recording medium 80 which is wider than the second recording medium 79, the same kind of operation is carried out to set the ink receiving port 75 at the position (at I in Fig. 9) that corresponds to the left edge 80a of the third recording medium.

[0064] When the ink receiving port 75 is at either one of the G, H, and I positions shown in Fig. 9, the ink, which is discharged from the recording head 81 to the ink receiving port 75, can flow into the ink absorbent 76 from the opening 78a by way of the tube 75b, hence being absorbed and retained in it.

[0065] The structure and operation of the ink jet recording apparatus 70 of the present embodiment are fundamentally the same as those of the ink jet recording apparatus 60 described in the third embodiment with the exception of what has been described so far. Here, therefore, the detailed description thereof will be omitted.

[0066] In this respect, the description has been made of each recording medium which has only three kinds of widths, and also, of the ink receiving port 75 which is positioned and set only in three different stages. However, these kinds and stages are not necessarily limited thereto. Also, for the present embodiment, the structural example is shown in which the ink receiving port 75 that corresponds to the left edge of each recording medium is only movable. However, it may be possible to arrange the structure so that the ink receiving port 75a that corresponds to the right edge of each recording medium is made movable.

[0067] As described above, it is possible for the ink jet recording apparatus 70 of the present embodiment to record without forming any marginal portions each on the left and right edges of each recording medium as in the case of the ink jet recording apparatus of the first to third embodiments.

(Fifth Embodiment)

[0068] Now, Fig. 11 and Fig. 12 are views which illustrate the structure of the recording unit 99 of an ink jet recording apparatus 90 schematically in accordance with a fifth embodiment of the present invention. Fig. 11 is a plan view and Fig. 12 is a cross-sectional view, respectively.

[0069] The ink jet recording apparatus 90 of the present embodiment is of the so-called line head type, which is provided with the line head 92 having the nozzle array 91 formed on the entire recording area in the sub-scanning direction for ink discharges. The line head 92 is detachably mounted on the head installation unit which is not shown. The nozzle array 91 is formed for the line head 92 on the side that faces each recording medium which will be described later. Also, the line head 92 is fixed to the main body of the ink jet recording apparatus 90 which is not shown by means of a fixing member which is not shown, either.

[0070] The ink discharging range of the nozzle array 91 of the line head 92 that records on the first recording medium 96 is between the first ink receiving port 94 and the second ink receiving port 95 which is set at a position corresponding to the left edge 96a of the first recording medium.

[0071] Also, when recording is made on the second recording medium 97 which is wider than the first recording medium 96, the ink discharging range of the nozzle array 91 of the line head 92 is between the first ink receiving port 94 and the second ink receiving port 95 which is set at a position corresponding to the left edge 97a of the second recording medium.

[0072] Likewise, when recording is made on the third recording medium 98 which is wider than the second recording medium 97, the ink discharging range of the nozzle array 91 of the line head 92 is between the first ink receiving port 94 and the second ink receiving port 95 which is set at a position corresponding to the left edge 98a of the third recording medium.

[0073] As described above, the distance from the first ink receiving port 94 to the second ink receiving port 95 which is set corresponding to the width of each medium becomes the range within which ink is discharged from the nozzle array 91 of the line head 92.

[0074] The structure and operation of the ink jet recording apparatus 90 of the present embodiment are fundamentally the same as those of the ink jet recording apparatus 70 described in the fourth embodiment with the exception of what has been described so far. Here, therefore, the detailed description thereof will be omitted.

[0075] In this respect, the description has been made of each recording medium which has only three kinds of widths, and also, of the ink receiving port 95 which is positioned and set only in three different stages. However, these kinds and stages are not necessarily limited thereto. Also, for the present embodiment, the structural example is shown in which the ink receiving port 95 that corresponds to the left edge of each recording medium is only movable. However, it may be possible to arrange the structure so that the first ink receiving port 94 that corresponds to the right edge of each recording medium is made movable.

[0076] As described above, it is possible for the ink jet recording apparatus 90 of the present embodiment to record without forming any marginal portions each on the left and right edges of each recording medium as in the case of the ink jet recording apparatus of the first to fourth embodiments.

(Sixth Embodiment)

[0077] Now, Fig. 13 is a cross-sectional view which schematically shows the recording unit 116 of an ink jet recording apparatus 100 in accordance with a sixth embodiment of the present invention.

[0078] The ink jet recording apparatus 100 of the present embodiment comprises a cover 101 provided with a first duct 102, which covers an ink jet recording cartridge 110 and bars 111; a first fan 103 installed in the first duct 102; the humidifier 107 for preventing the viscosity of ink from being raised, which is provided with a humidifying nozzle 108 in the first duct 102; and the humidity sensor 106 that detects the humidity in the cover 101. Also, the ink absorbent case 113 is provided with a second duct 104. Then, in the second duct 104, a second fan 105 is installed.

[0079] The first fan 103 is to induce the air into the cover 101, which is driven by a motor (not shown). The humidifier 107 belches out steam from the humidifying nozzle 108 to humidify the air induced from the first fan 103. The humidity of the air induced by the first fan 103 and humidified by the humidifier 107 is detected by the humidity sensor 106. The humidifier 107 is controlled to make the interior of the cover 101 humid as desired in accordance with signals transmitted from a humidifier controller (not shown) that operates based upon the detected signals transmitted from the humidity sensor 106. The air which has made the interior of the cover 101 humid as desired is arranged to flow into the ink absorbent 114 through the ink receiving port 109. The air that has flown into the ink absorbent 114 is exhausted outside by the second fan 105 installed in the second duct 104 of the ink absorbent case 113, which is driven by a motor (not shown) after having passed inside the ink absorbent 114.

[0080] The structure and operation of the ink jet recording apparatus 100 of the present embodiment are fundamentally the same as those of the ink jet recording apparatus 40 described in the second embodiment with the exception of what has been described so far. Here, therefore, the detailed description thereof will be omitted.

[0081] In this respect, for the present embodiment, the description has been made of one example in which the bars 111 are used for regulating the positions of the recording medium 112. However, the positional regulation is not necessarily limited to the provision of the bars. For example, it may be possible to use a plate member provided with linear extrusions or an embossed plate member.

[0082] Also, the structure of the present embodiment may be the one which is applicable to either one of the ink jet recording apparatuses described in the first embodiment to the fifth embodiment, and the seventh embodiment which will be described later.

[0083] As described above, the air in the cover 101 flows into the ink absorbent case 113 through the ink receiving port 109 after having flown around the recording head 115. As a result, the ink mist of the ink that has been discharged from the recording head 115 of the ink jet recording head cartridge 110, which is allowed to float in the air, is compulsorily exhausted into the ink absorbent case 113. Thus, there is no possibility that the recording medium 112 is stained with ink mist.

[0084] As has been described above, it is possible for the ink jet recording apparatus 100 of the present embodiment to record without forming any marginal portions each on the left and right edges of each recording medium as in the case of the ink jet recording apparatus of the first to fifth embodiments.

(Seventh Embodiment)

[0085] Now, Fig. 14 is a perspective view which schematically shows the structure of the recording unit 139 of an ink jet recording apparatus 120 in accordance with a seventh embodiment of the present invention. Also, Fig. 15 and Fig. 16 are cross-sectional views which schematically illustrate the state where recording is made respectively on the front end portion 137 and on the rear end portion 138 of the recording medium 127 by use of the recording unit 139 of the ink jet recording apparatus 120 shown in Fig. 1.

[0086] In accordance with the present embodiment, the platen plate 121 of the ink jet recording apparatus 120 is provided with a first movable platen plate 122 capable of being open and closed, and a second movable plate 123. Also, for the platen plate 121, a front side ink receiving port 132 is formed to connect the ink receiving port 132a and the ink receiving port 132b corresponding to the left and right edges of the recording medium 127. Also, the rear side ink receiving port 133 is formed to connect the ink receiving port 132a and the ink receiving port 132b corresponding to the left and right edges of the recording medium 127.

[0087] Now, the description will be made of a method for recording borders 134 on the recording medium 127 by use of the ink jet recording apparatus 120 of the present embodiment.

[0088] As shown in Fig. 15, the recording medium 127 is nipped by the first sub-scanning rollers 127 and 128 and carried to a place under the nozzle array 125 of the recording head 124. Then, the first movable platen plate 122 is retracted in the direction indicated by an arrow a so that the front side ink receiving port 132 is in the state of being open. In this state, ink 126a and ink 126b are discharged from the nozzle array 125. Ink 126b thus discharged is mainly directed toward the front

side ink receiving port 132, and ink 126a thus discharged is directed to the front edge portion 137 of the recording medium 127 to form the border 134.

[0089] Then, as the recording medium 127 is carried while being nipped by the second sub-scanning rollers 130 and 131, the training end 138 of the recording medium 127 passes under the nozzle array 125 of the recording head 124. At this juncture, the second movable platen plate 123 is retracted in the direction indicated by an arrow b so that the rear side ink receiving port 133 is in the state of being open. In this state, ink 126c and ink 126d are discharged from the nozzle array 125. Ink 126c thus discharged is mainly directed toward the rear side ink receiving port 133, and ink 126d thus discharged is directed to the rear edge portion 138 of the recording medium 127 to form the border on the rear edge portion.

[0090] In this respect, Fig. 14 is a perspective view which shows the state in which the border 134 is formed on the front edge portion 137 of the recording medium 127, and shows the state of the front side ink receiving port 132 being open with the retraction of the first movable platen plate 122. Here, the second movable platen plate 123 is in the state of being closed to cover the rear side ink receiving port 133.

[0091] The structure and operation of the ink jet recording apparatus 120 of the present embodiment are fundamentally the same as those of the ink jet recording apparatus 1 described in the first embodiment with the exception of what has been described so far. Here, therefore, the detailed description thereof will be omitted.

[0092] In this respect, for the present embodiment, the description has been made of one example in which the flat plate type is used for the platen plate 121. However, the platen plate is not necessarily limited to the flat type one. It may be possible to use a plate member which is configured not to be in contact with each recording medium. For example, a plate member provided with linear extrusions or an embossed plate member may be adoptable.

[0093] Also, the structure of the present embodiment may be the one which is applicable to the line-head type ink jet recording apparatus described in the fifth embodiment.

[0094] Further, the structure may be arranged so that the widths of the front side ink receiving port 132, the first movable platen plate 122, the rear side ink receiving port 133, and the second movable platen plate 123 can be made wider in the main scanning direction than the maximum width of a recording medium to be used for recording, hence dealing with each recording medium of different width.

[0095] With the structured arranged as described above, not only it is possible for the ink jet recording apparatus 120 of the present embodiment to record without forming any marginal portions each on the front edge 137 and the rear edge 138, but also, to record without forming any marginal portions on the left and right edges of each recording medium as in the case of the ink jet recording apparatus of the first to sixth embodiments.

[0096] Now, hereunder the description will be made of the above embodiment with the specific dimensions.

[0097] For the present embodiment, the border 13 is recorded on the recording medium 9 by use of the ink jet recording apparatus 1 described in the first embodiment.

[0098] The distance L_2 between the outer end portion 11c which is the outer edge of the ink receiving port 11a, and the outer end portion 11d which is the outer edge of the ink receiving port 11b is 230 mm. The range L_3 of ink discharges is 220 mm. Also, the recording medium 9 is an A4-sized sheet (297 mm × 210 mm). The recording medium 9 is carried in the longitudinal direction for recording. Therefore, the width L_1 of the recording medium 9, which is from the right edge 9a to the left edge 9b, is 210 mm.

[0099] In case of the above structure, ink is discharged in a range which is wider than the distance across both edges of the recording medium by 5 mm each. Therefore, it becomes possible to smear the edges of the recording medium 9 sufficiently even if the feeding position of the recording medium is deviated in a range of approximately by 1 to 3 mm. Also, the ink discharges terminate within a range which is narrower than the distance across the outer end portion 11c of the ink receiving port 11a and the outer end portion 11d of the ink receiving port 11b by 5 mm each, hence making it possible to collect the ink which is discharged but does not arrive at the recording medium 9 without staining the platen plate 10.

[0100] As has been described, the ink jet recording apparatus of the present embodiment comprises carrying means for carrying a recording medium; the head installation unit which mounts on it the recording head for recording on the recording medium by discharging ink from the discharge ports thereof, and which reciprocates in the width direction of the recording medium, which is orthogonal to the carrying direction thereof; and supporting means for supporting the recording medium on the position that faces the recording head. Then, the opening is arranged on each end portion of the recording medium in the width direction in order to collect ink discharged from the recording head, thus making it possible to record up to the edges of the recording medium in high quality.

Claims

1. An ink jet recording apparatus comprising:

carrying means for carrying a recording medium;

a head installation unit for installing a recording head to record on said recording medium by

discharging ink from discharge ports, said head installation unit reciprocating in the width direction intersecting the carrying direction of said recording medium;

supporting means for supporting said recording medium in a position facing said recording head; and

an opening portion for collecting ink discharged from said recording head at the edge of said recording medium in the width direction.

2. An ink jet recording apparatus according to Claim 1, further comprising:

a tube communicated with said opening, the opening area of said opening being wider than the sectional area of said tube.

3. An ink jet recording apparatus according to Claim 1, wherein said supporting member is a plurality of bars arranged in parallel in said width direction.

4. An ink jet recording apparatus according to Claim 1, wherein said opening portion is arranged in plural numbers in the direction intersecting said carrying direction.

5. An ink jet recording apparatus according to Claim 4, wherein at least one of said openings arranged in plural numbers is movable in said width direction.

6. An ink jet recording apparatus according to Claim 5, wherein the movement of said movable opening is interlocked with positioning means for positioning said recording medium in said width direction.

7. An ink jet recording apparatus according to Claim 1, wherein said opening is formed in the position away from the surface other than the recording surface of said recording medium substantially in normal direction on the surface other than the supporting surface for supporting said recording medium.

8. An ink jet recording apparatus according to Claim 1, comprising:

a plurality of opening portions formed in parallel for said supporting member in a position facing said recording medium in the carrying direction of said recording medium; and

a plurality of covers movable to open and close each of said openings.

9. An ink jet recording apparatus according to Claim 1, comprising:

air current generating means for generating an air current directed from said recording head to each of said openings.

10. An ink jet recording apparatus according to Claim 9, comprising:

humidifying means for humidifying said air current.

11. An ink jet recording apparatus according to Claim 1, wherein said recording head is provided with electrothermal transducing elements for generating thermal energy for use of ink discharges.

12. An ink jet recording apparatus according to Claim 11, wherein ink is discharged from discharge ports by utilization of film boiling created in ink by the application of thermal energy by means of said electrothermal transducing elements.

13. An ink jet recording apparatus comprising:

carrying means for carrying a recording medium in the carrying direction of said recording medium;

a head installation unit for installing a recording head to record on said recording medium, said recording head discharging ink from a plurality of discharge ports arranged in a range exceeding the passage area of said recording medium in the width direction intersecting said carrying direction;

supporting means for supporting said recording medium in a position facing said recording head; and

an opening portion for collecting ink discharged from said recording head at each edge of said recording medium in the width direction.

14. An ink jet recording apparatus according to Claim 13, further comprising:

a tube communicated with said opening, the opening area of said opening being wider than the sectional area of said tube.

15. An ink jet recording apparatus according to Claim 13, wherein said supporting member is a plurality of bars arranged in parallel in said width direction.

16. An ink jet recording apparatus according to Claim 13, wherein said opening portion is arranged in plural numbers in the direction intersecting said carrying direction.

17. An ink jet recording apparatus according to Claim 16, wherein at least one of said openings arranged in plural numbers is movable in said width direction.

18. An ink jet recording apparatus according to Claim 17, wherein the movement of said movable opening is interlocked with positioning means for positioning said recording medium in said width direction.

19. An ink jet recording apparatus according to Claim 13, wherein said opening is formed in the position away from the surface other than the recording surface of said recording medium substantially in normal direction on the surface other than the supporting surface for supporting said recording medium.

20. An ink jet recording apparatus according to Claim 13, comprising:

a plurality of opening portions formed in parallel for said supporting member in a position facing said recording medium in the carrying direction of said recording medium; and
a plurality of covers movable to open and close each of said openings.

21. An ink jet recording apparatus according to Claim 16, comprising:

air current generating means for generating an air current directed from said recording head to each of said openings.

22. An ink jet recording apparatus according to Claim 21, wherein said recording head is provided with electrothermal transducing elements for generating thermal energy for use of ink discharges.

23. An ink jet recording apparatus according to Claim 14, comprising:

air current generating means for generating an air current directed from said recording head to said opening.

24. An ink jet recording apparatus according to Claim 23, wherein ink is discharged from discharge ports by utilization of film boiling created in ink by the application of thermal energy by means of said electrothermal transducing elements.

25. An ink jet recording method for recording on a recording medium by discharging ink from a recording head comprising the following steps of:

arranging carrying means for carrying said recording medium;
arranging said recording head in a position facing said recording medium;
arranging supporting means for supporting said recording medium in a position facing said recording head; and
collecting ink discharged from said recording head with openings provided for the edges of said recording medium in the width direction.

26. An ink jet recording method according to Claim 25, further comprising the following step of:

generating an air current directed toward a plurality of openings formed to receive ink discharged from said recording head.

27. An ink jet recording method according to Claim 26, further comprising the following step of:

humidifying said air current.

28. An ink jet recording apparatus for recording on a recording medium, comprising:

recording medium conveying means for conveying a recording medium in a first direction;
recording head carrying means for carrying an ink jet recording head to enable the recording head to eject printing liquid from at least one discharge port across a width of the recording medium transverse to the first direction; and
printing liquid collection means for collecting printing liquid discharged by the recording head towards the recording medium that misses an edge of the recording medium so as to enable recording up to the edge of the recording medium.

29. An ink jet recording apparatus for recording on a medium, comprising:

a platen for supporting a recording medium;
recording head carrying means for carrying an ink jet recording head to enable the recording head to eject printing liquid from at least one discharge port across a width of the recording medium; and printing liquid collection means for collecting printing liquid discharged by the recording head towards the recording medium that misses an edge of the recording medium so as to enable recording up to the edge of the recording medium, wherein the platen is provided with apertures or recesses to enable printing liquid discharged by the recording head towards the recording medium that misses an edge of the recording medium pass through or by the platen to be collected by the printing liquid collection means.

FIG. 1

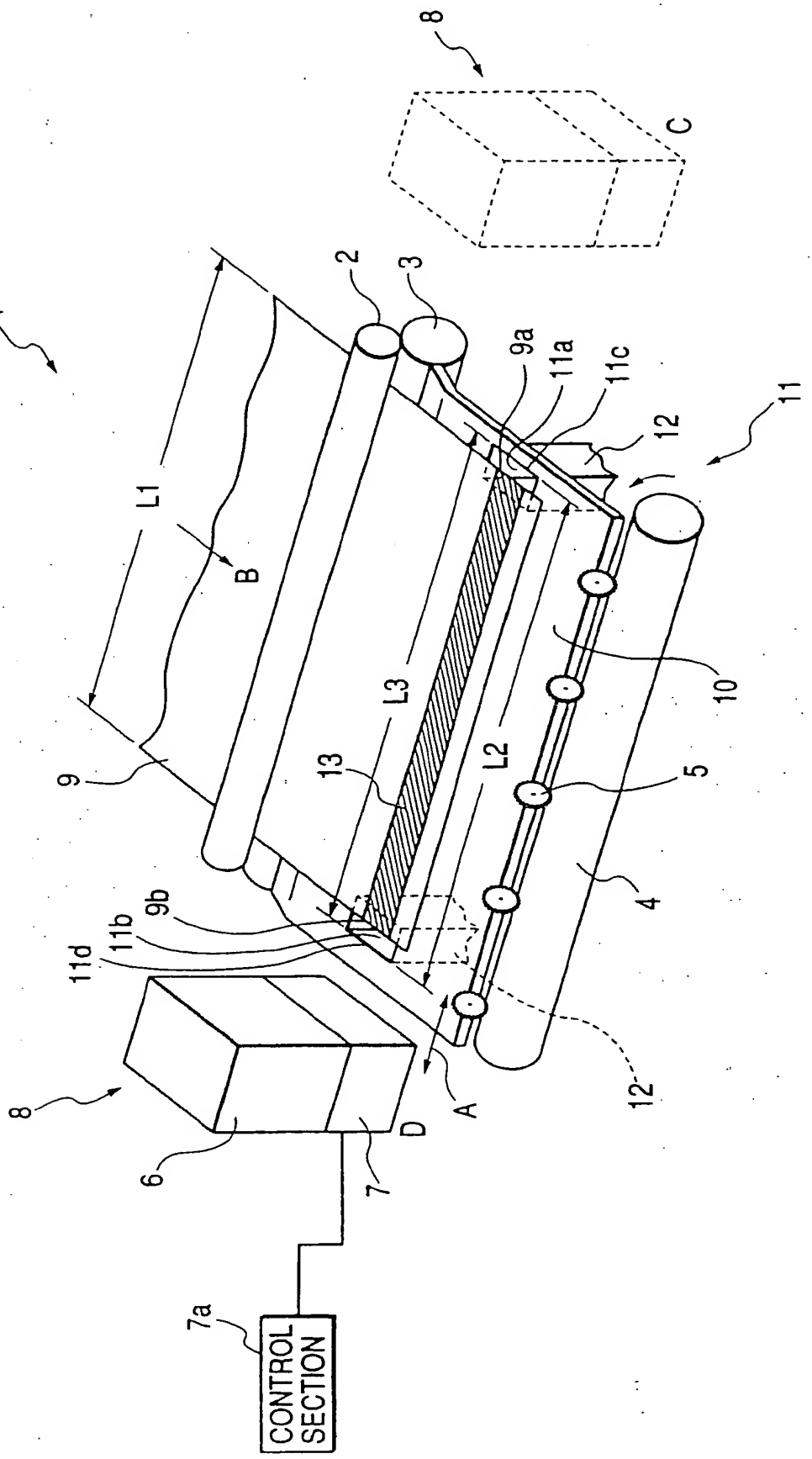

8
C
1
2
3
9a
11a
11c
12
11
L1
B
10
L3
L2
13
9
5
4
9b
11b
11d
12
8
A
D
6
7
7a
CONTROL SECTION

FIG. 2

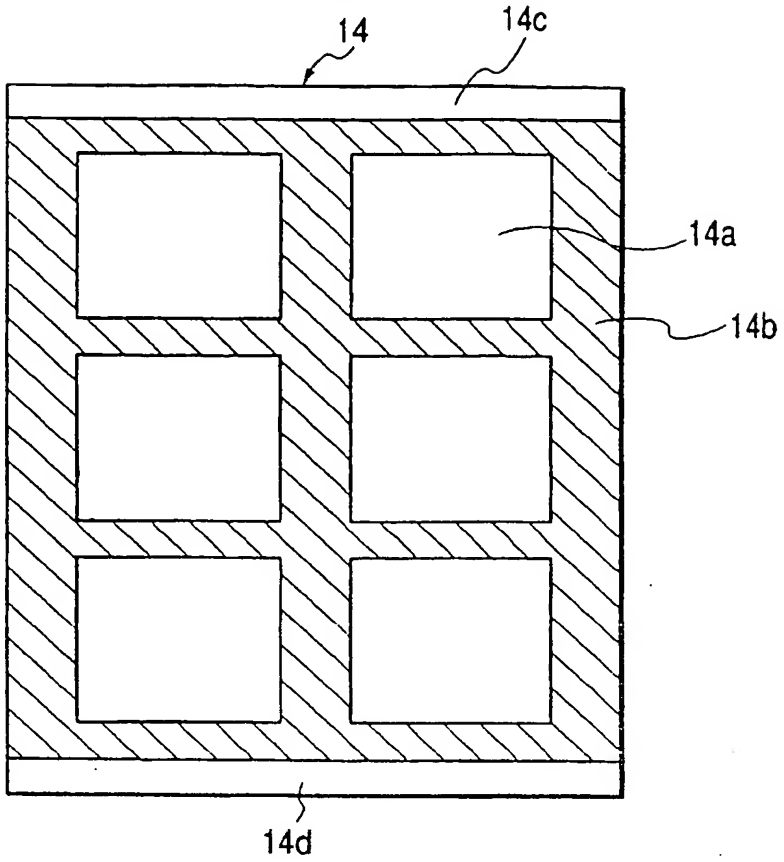


FIG. 3

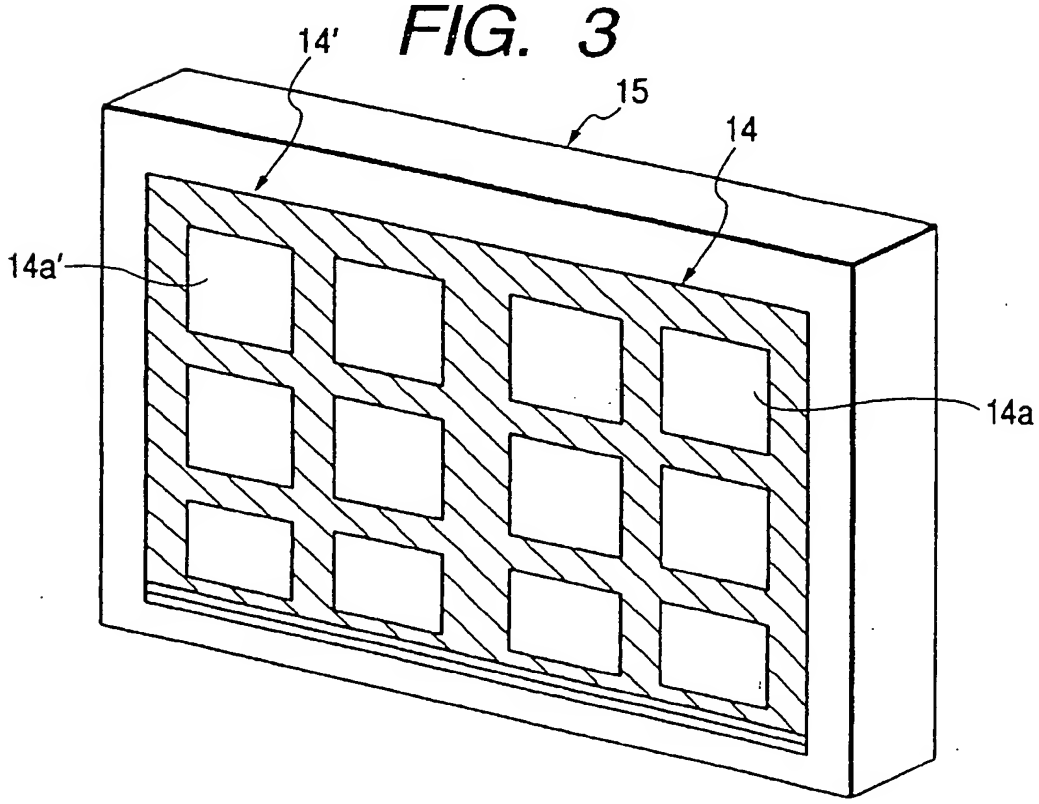


FIG. 4

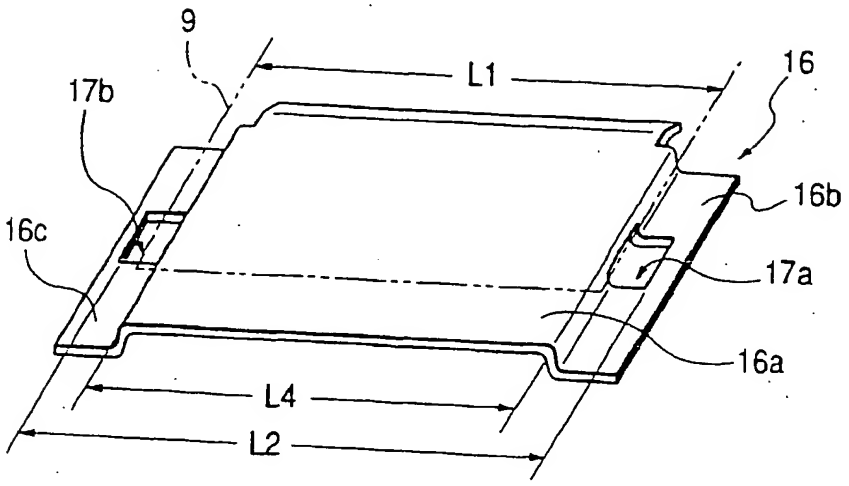
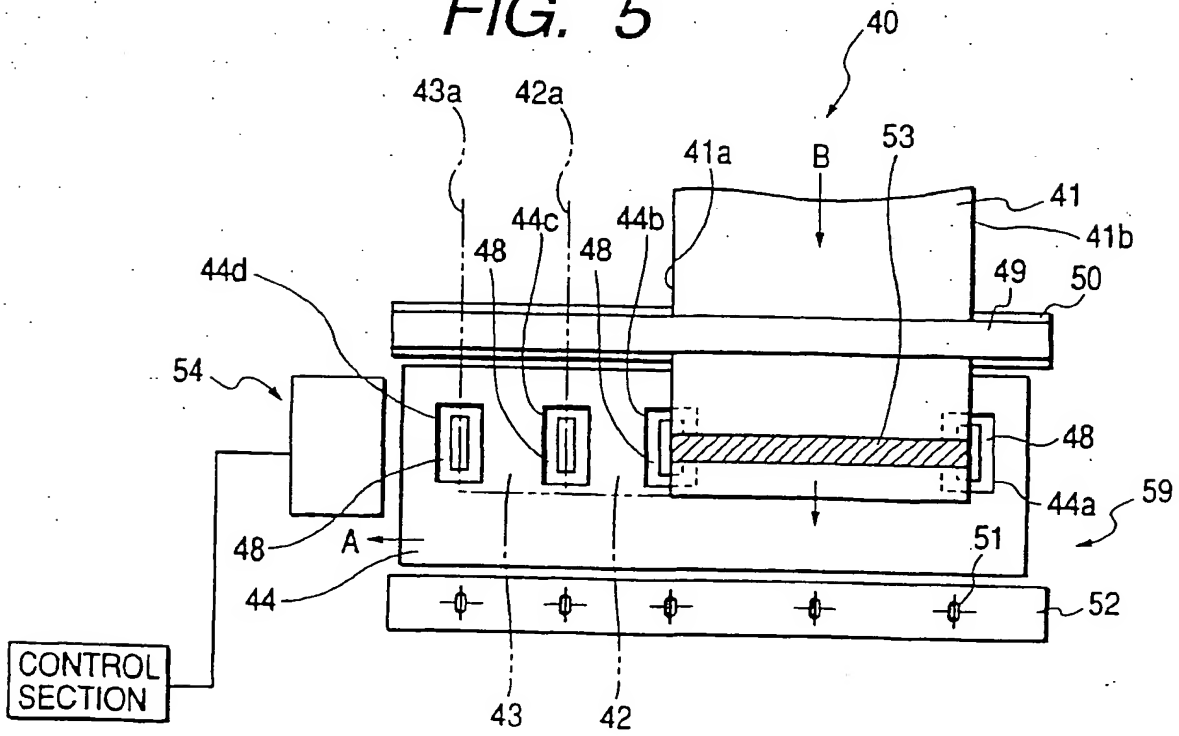

9
L1
16
17b
16b
16c
17a
16a
L4
L2

FIG. 5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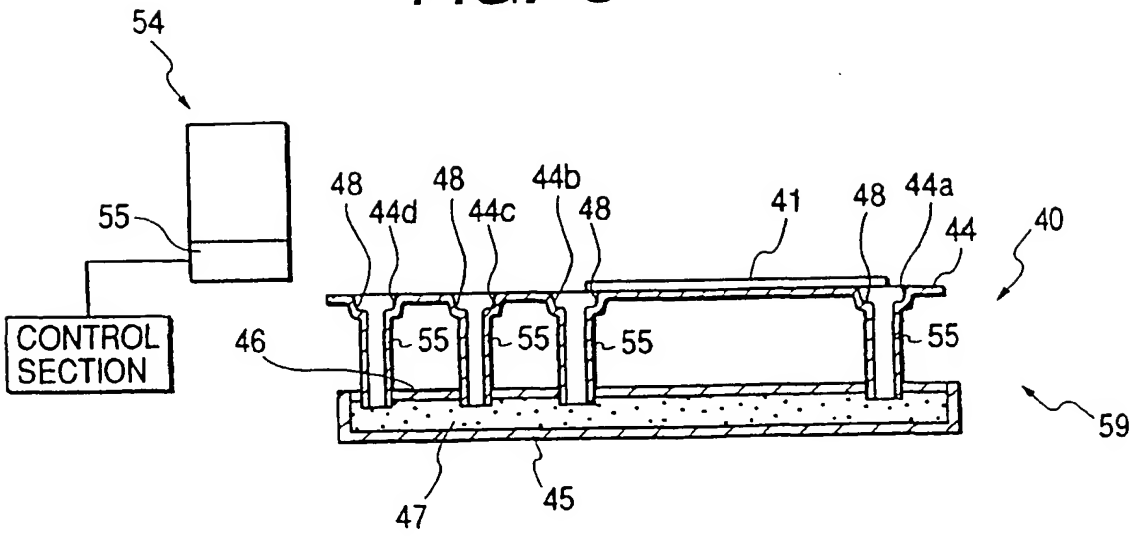
43a
42a
41a
B
53
41
41b
44c
44b
48
48
44d
49
50
54
48
44a
59
48
A
51
44
52
CONTROL SECTION
43
42

FIG. 6


54
55
CONTROL SECTION
48
44d
48
44c
44b
48
41
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44a
44
40
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55
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55
55
59
47
45

FIG. 7

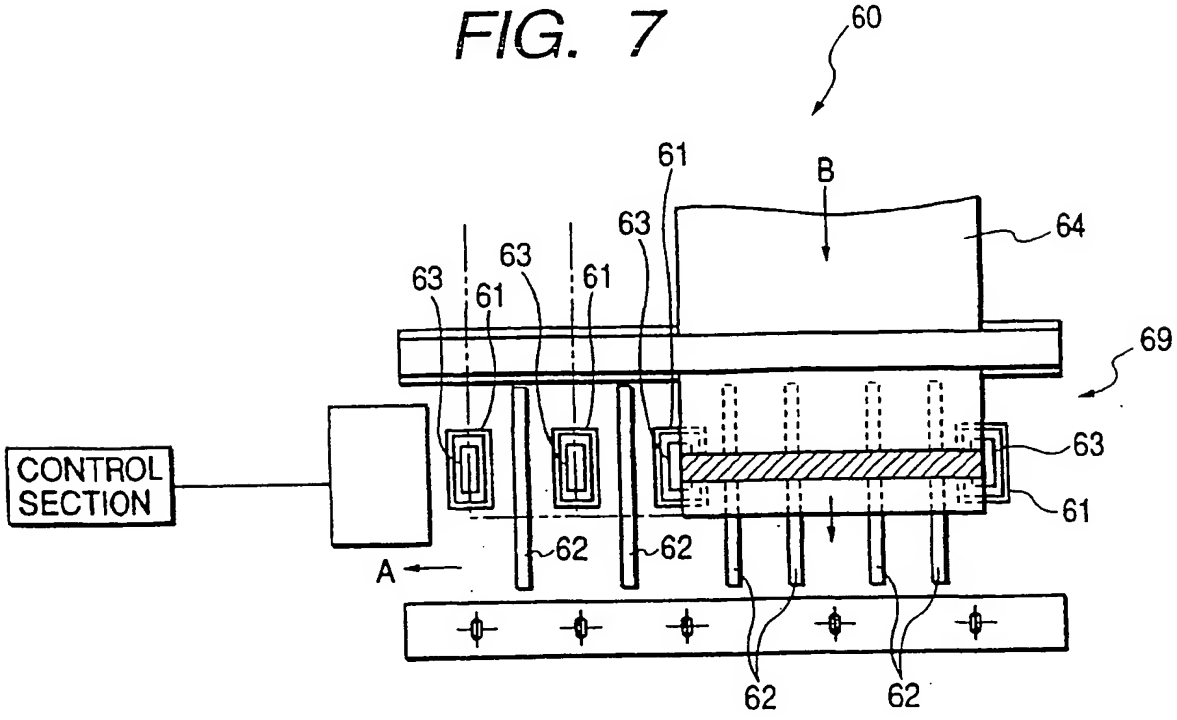
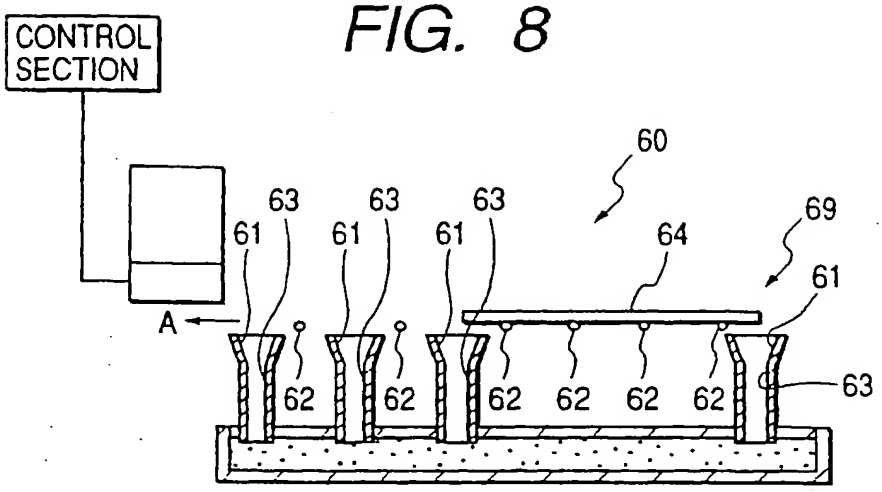

60
61
B
63
64
63
61
63
61
69
CONTROL SECTION
63
61
62
62
A
62
62

FIG. 8


CONTROL SECTION
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62
62
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62
63

FIG. 9

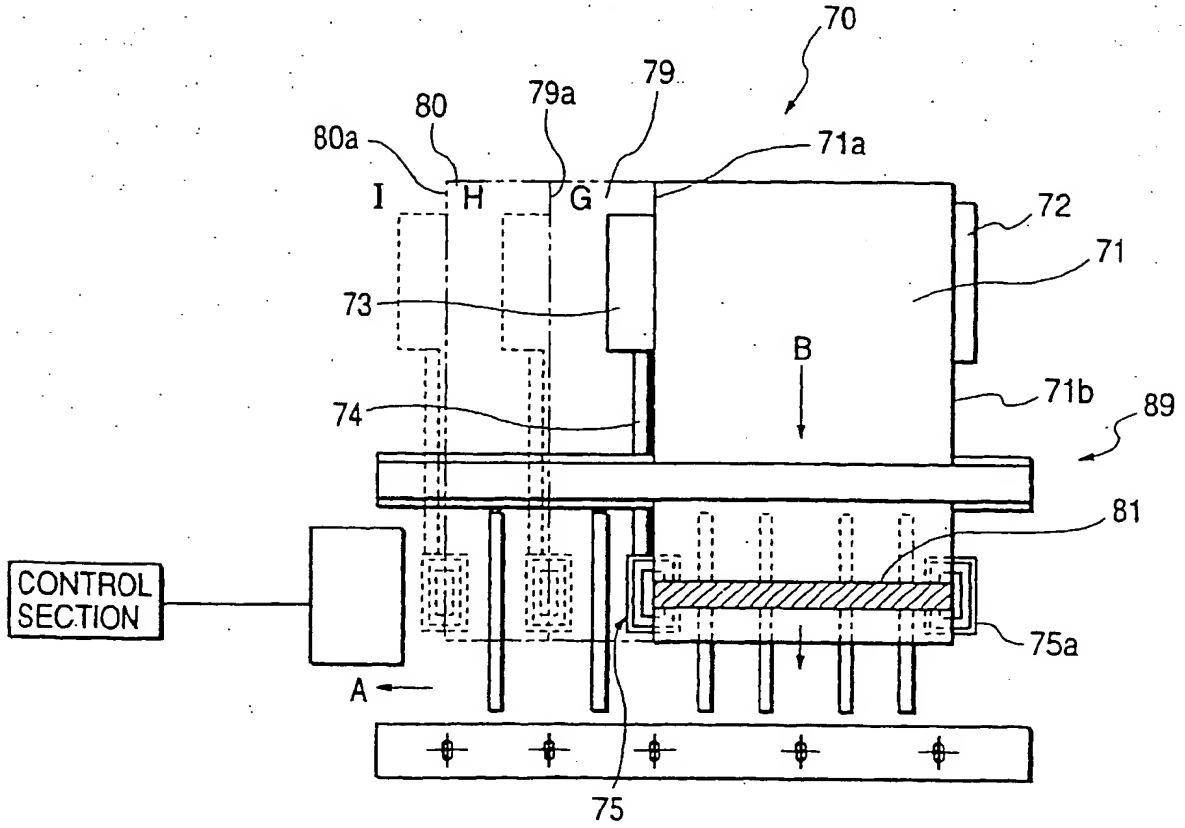
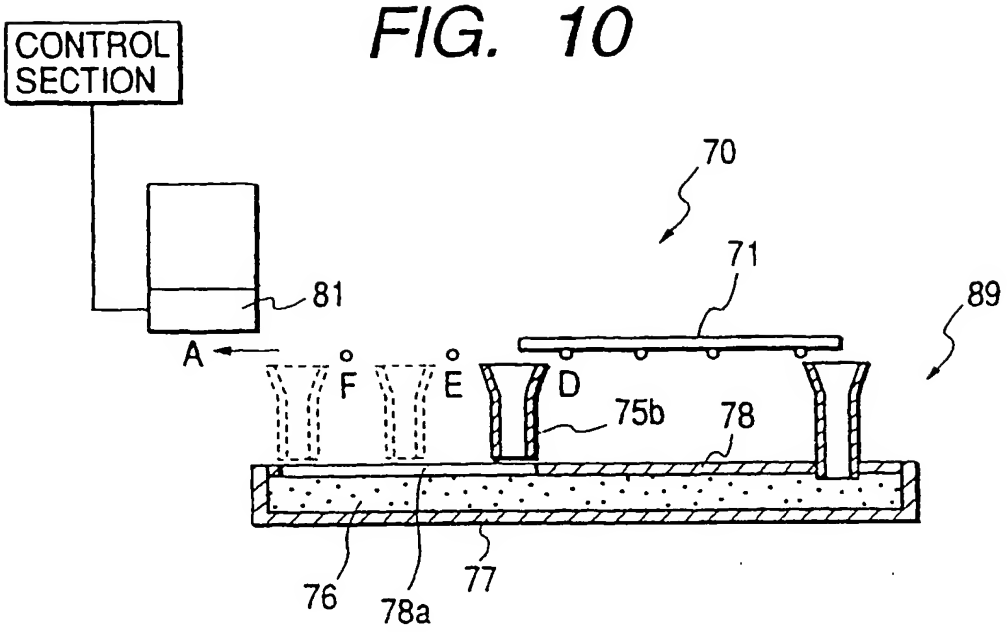

70
79
79a
80
80a
71a
I
H
G
72
71
73
B
71b
89
74
81
CONTROL SECTION
75a
A
75

FIG. 10


CONTROL SECTION
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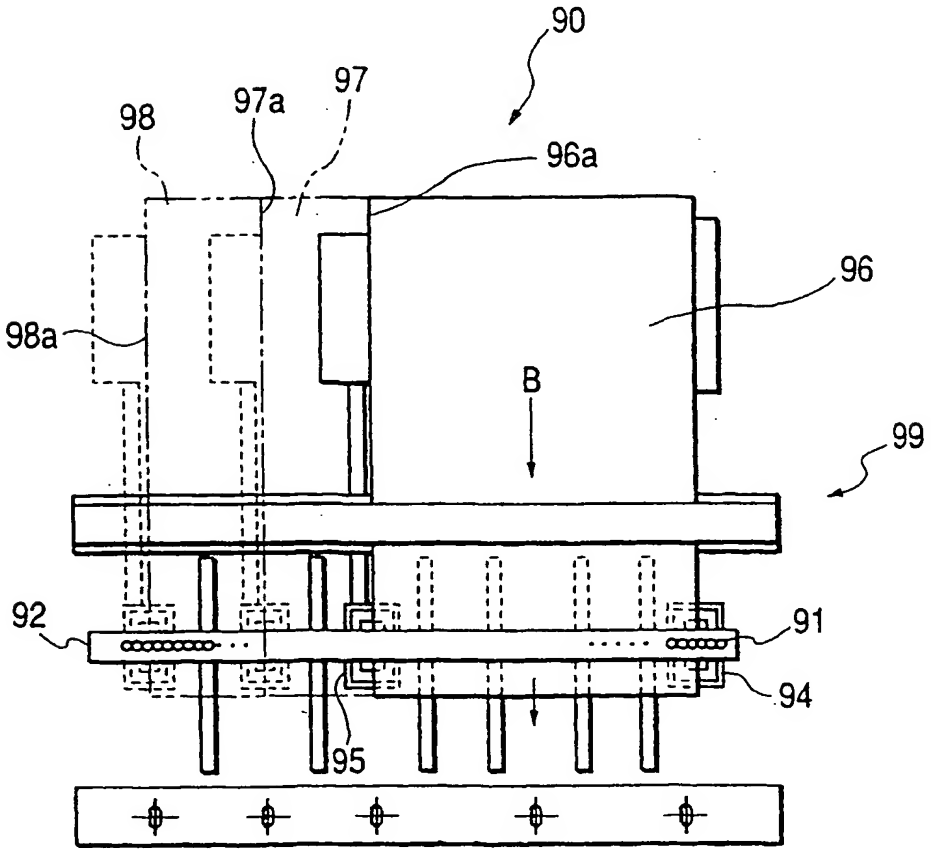
71
81
89
A
F
E
D
75b
78
76
78a
77

FIG. 11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98
97a
97
96a
96
98a
B
99
92
91
94
95

FIG. 12

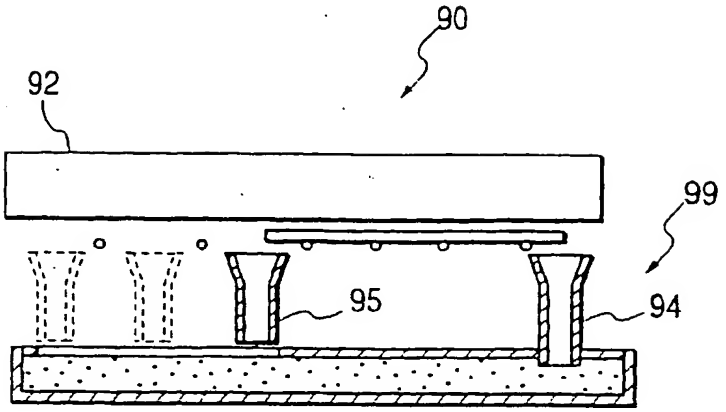
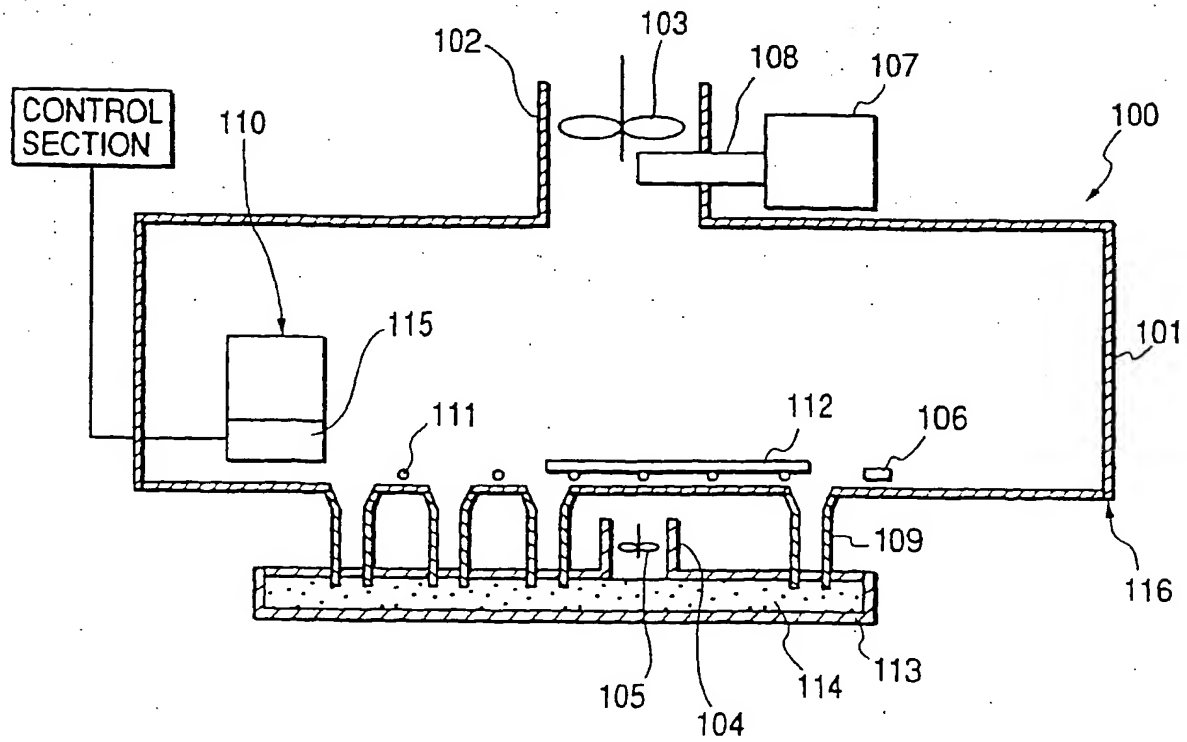

90
92
99
95
94

FIG. 13


CONTROL SECTION
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116
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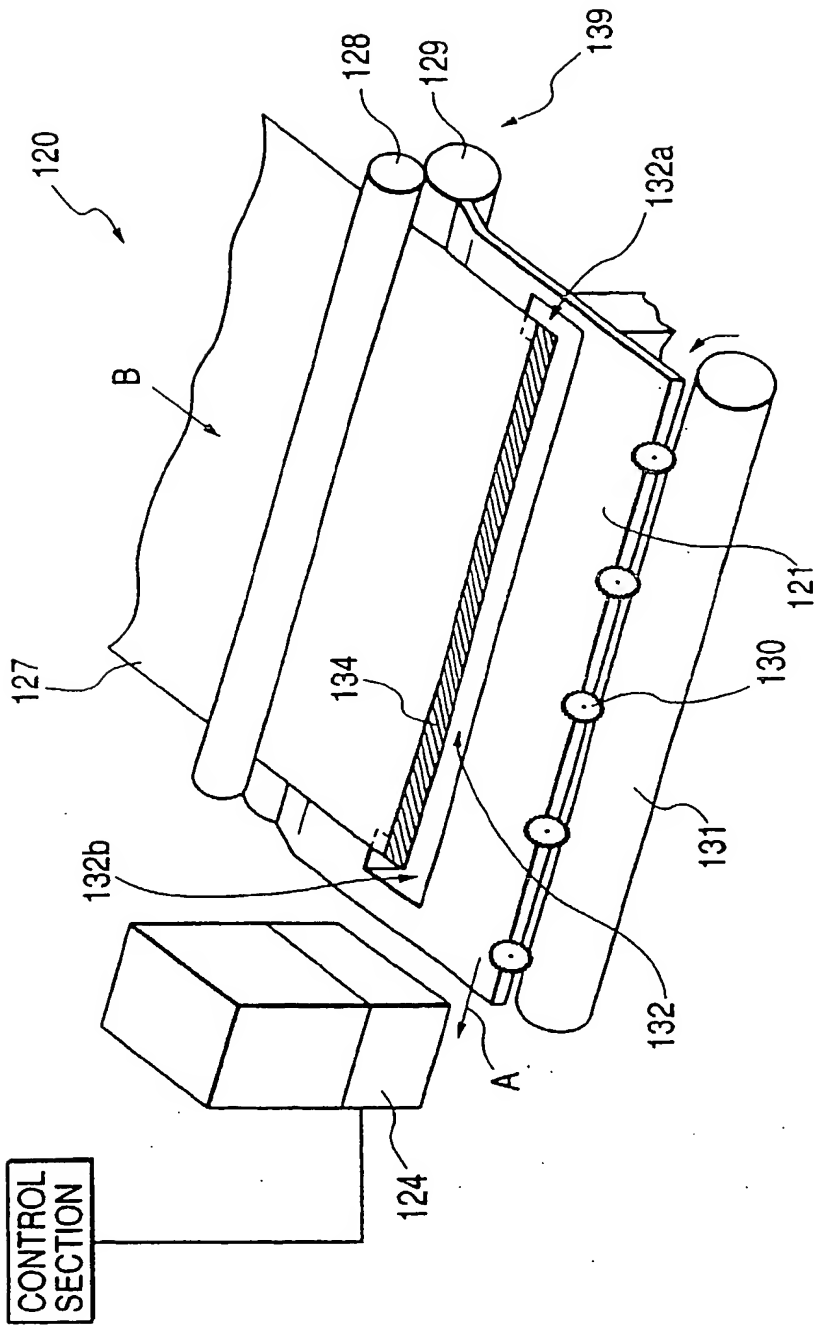
113

FIG. 14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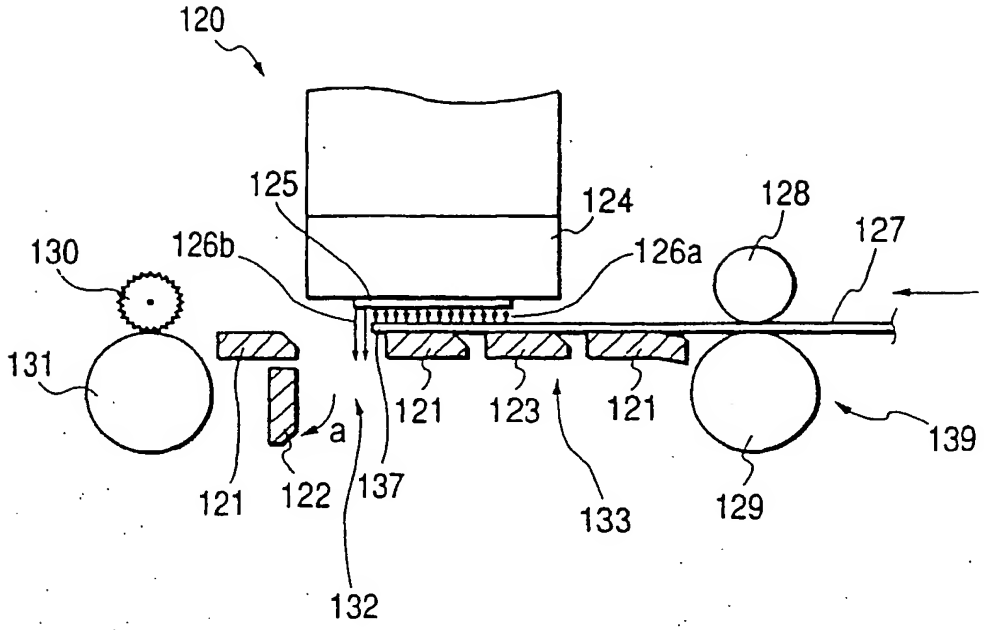
128
129
139
132a
B
127
134
121
130
131
132b
132
A
124
CONTROL SECTION

FIG. 15


120
125
124
128
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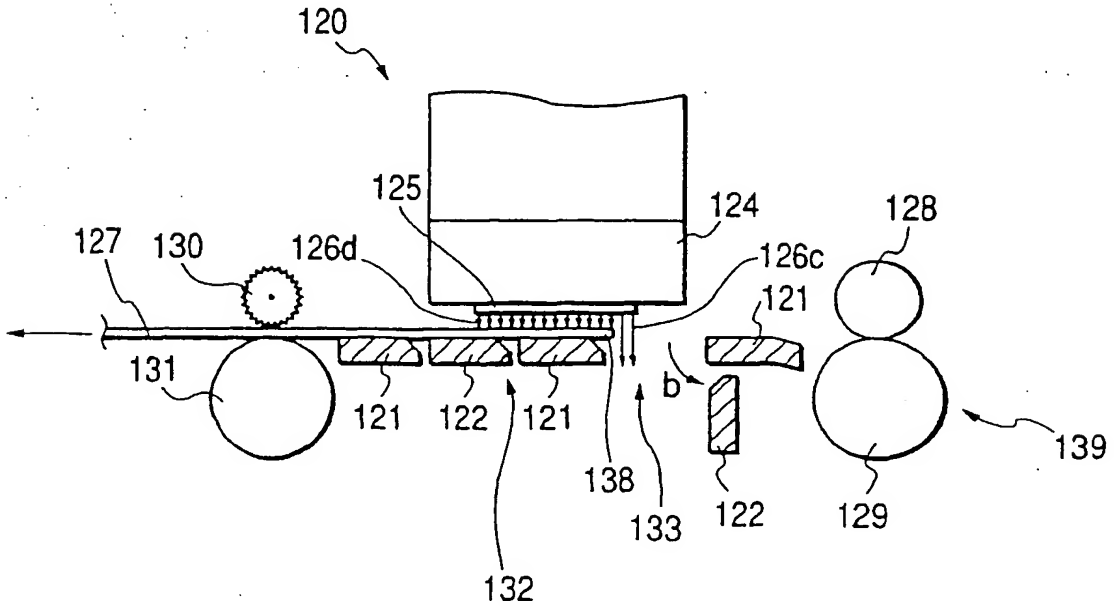
126b
126a
131
121
123
121
139
a
121
122
137
133
129
132

FIG. 16


120
125
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126d
126c
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b
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132

FIG. 17

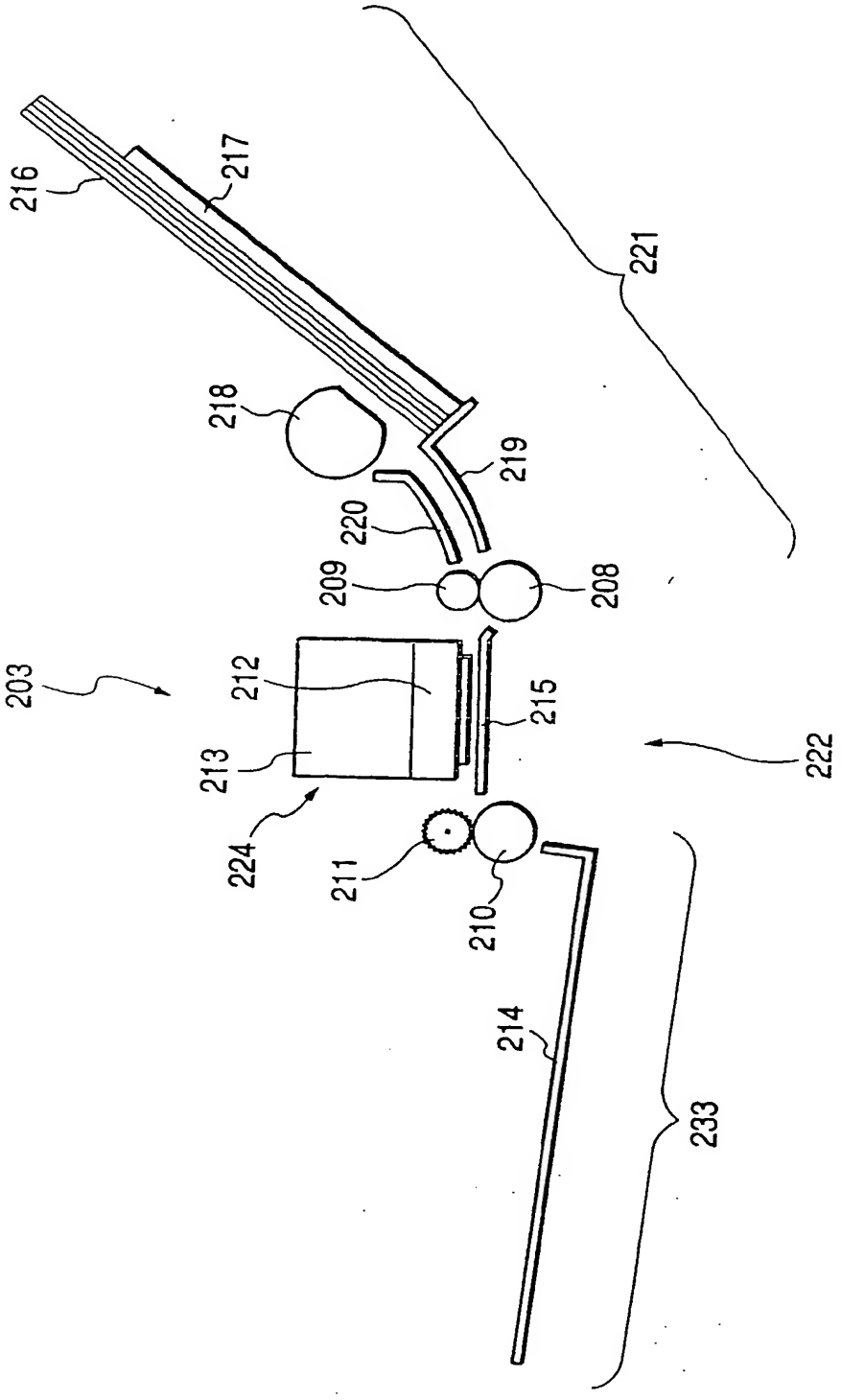
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FIG. 18

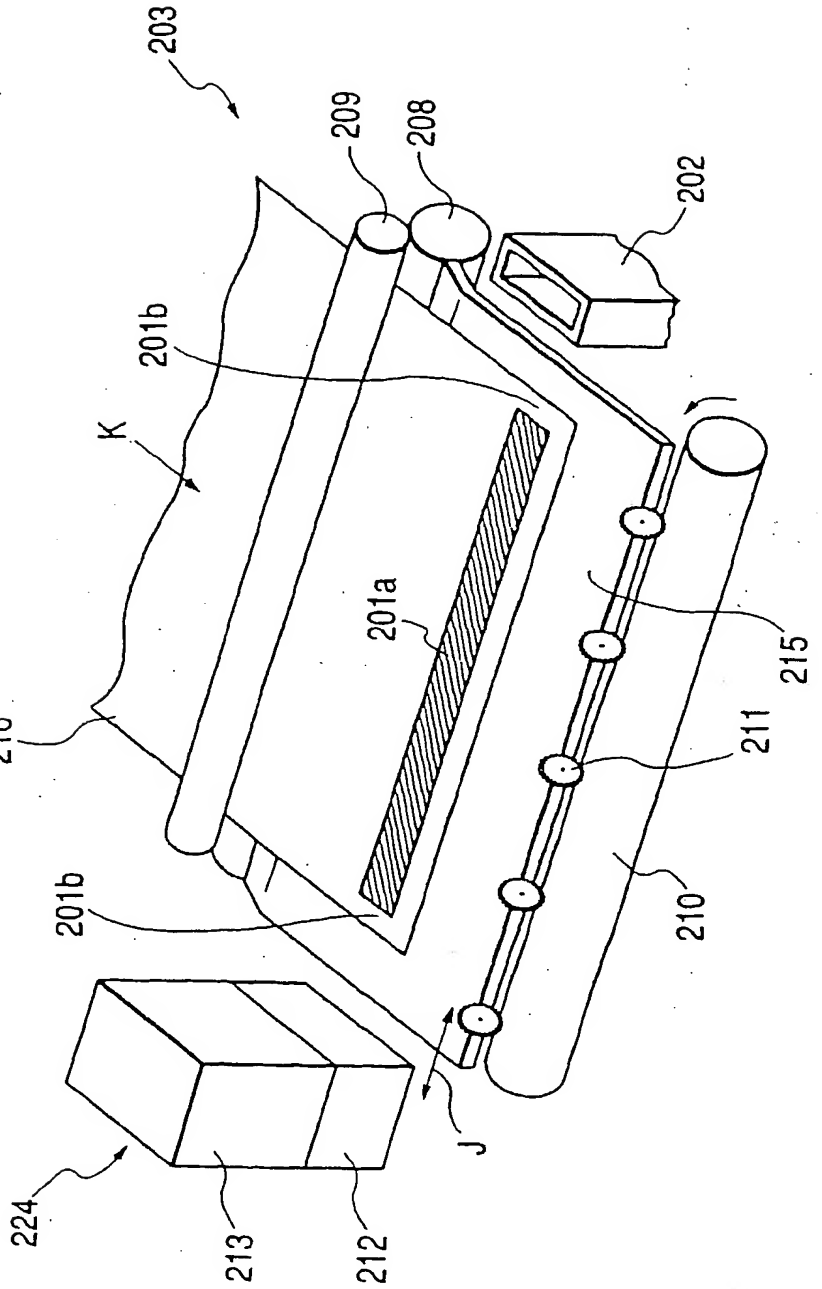

FIG. 19

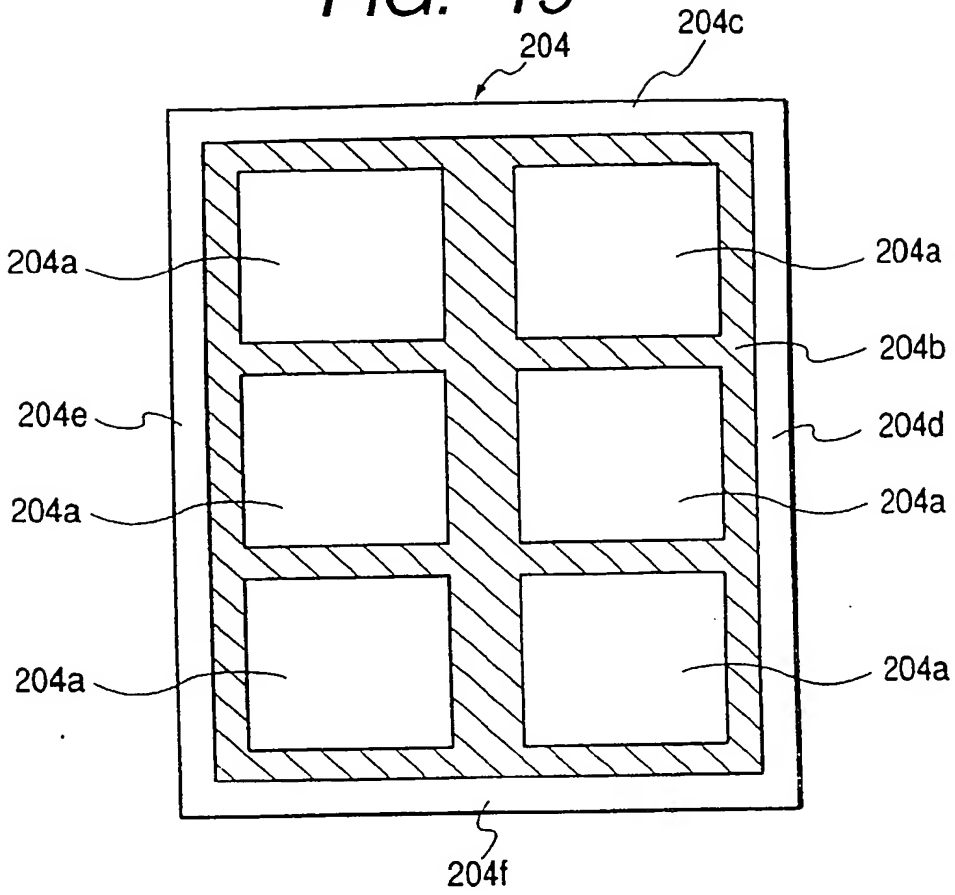
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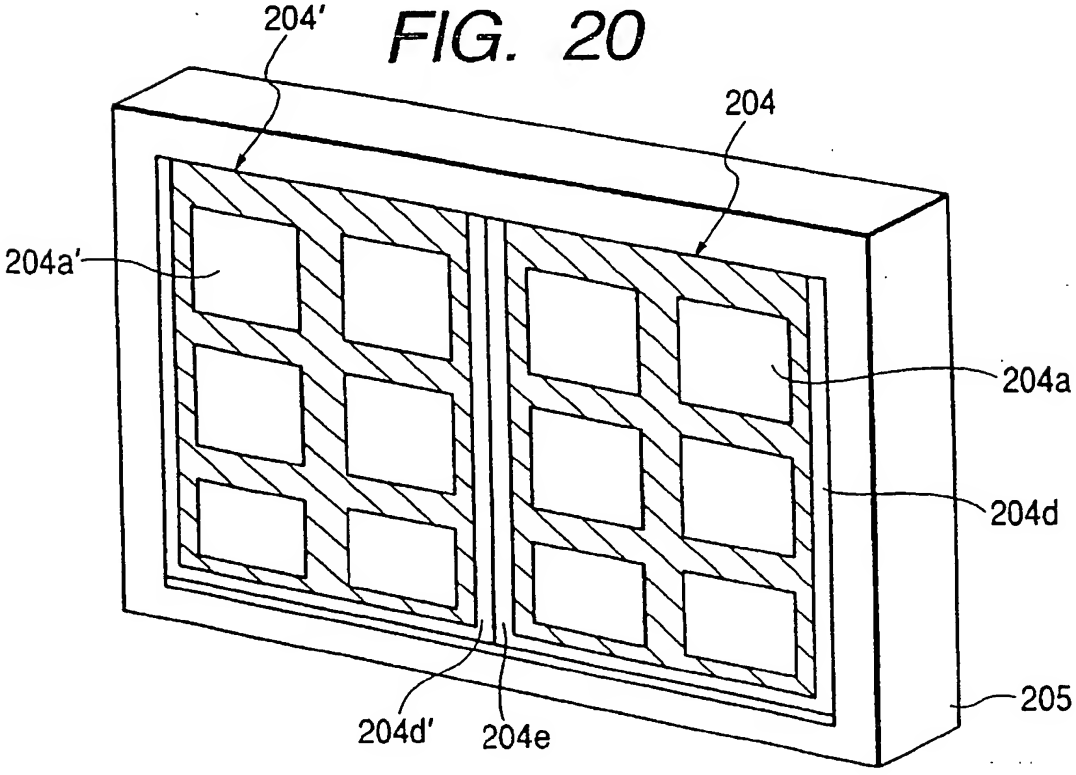
FIG. 20


204'
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204a'
204a
204d
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204d'
204e

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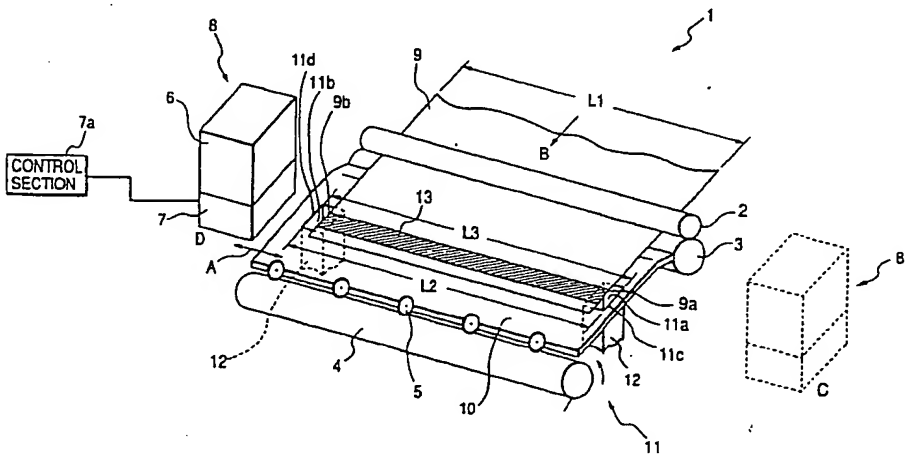
(54) Ink jet recording apparatus and ink jet recording method

(57) An ink jet recording apparatus comprises carrying means for carrying a recording medium; a head installation unit for installing a recording head to record on the recording medium by discharging ink from discharge ports, which reciprocates in the width direction intersecting the carrying direction of the recording medium; supporting means for supporting the recording medium in a position facing the recording head; and opening portions for collecting ink discharged from the recording head at the edges of the recording medium in the width direction. With the structure thus arranged, this ink jet recording apparatus is capable of recording up to the edges of a recording medium in high quality without staining the recording medium.

FIG. 1



EP 1 059 168 A3

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EUROPEAN SEARCH REPORT

Application Number
EP 00 30 4624

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 5 291 227 A (SUZUKI SHIGERU) 1 March 1994 (1994-03-01)	1,3,4, 13,15, 16,25, 28,29	B41J2/01 B41J2/165 B41J29/377
Y	* the whole document *	2,5,6, 14,17,18	
D,X	EP 0 707 973 A (SEIKO EPSON CORP) 24 April 1996 (1996-04-24)	1,25,28, 29	
Y	* column 10, line 26 - column 13, line 10; figures 7,8 *	2,14	
X	EP 0 842 779 A (SEIKO EPSON CORP) 20 May 1998 (1998-05-20)	1,25,28, 29	
Y	* column 3, line 11 - column 4, line 4; figures 4,5 *	5,6,17, 18	
X	EP 0 724 965 A (CANON KK) 7 August 1996 (1996-08-07) * the whole document *	1,25,28, 29	
P,X	EP 0 992 347 A (EASTMAN KODAK CO) 12 April 2000 (2000-04-12) * the whole document *	1,25,28, 29	TECHNICAL FIELDS SEARCHED (Int.Cl.7) B41J
P,X	EP 0 995 603 A (HEWLETT PACKARD CO) 26 April 2000 (2000-04-26) * the whole document *	1,25,28, 29	
A	EP 0 616 893 A (CANON KK) 28 September 1994 (1994-09-28) * column 17, line 23 - line 45; figures 10,11 *	1,25,28, 29	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 February 2001	De Groot, R

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14-02-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5291227 A	01-03-1994	JP 2945781 B	06-09-1999
		JP 4341848 A	27-11-1992
EP 0707973 A	24-04-1996	JP 8169155 A	02-07-1996
		CN 1134360 A	30-10-1996
		DE 69516478 D	31-05-2000
		DE 69516478 T	26-10-2000
		US 5997129 A	07-12-1999
EP 0842779 A	20-05-1998	JP 10146987 A	02-06-1998
		US 6145955 A	14-11-2000
EP 0724965 A	07-08-1996	JP 8197802 A	06-08-1996
		EP 1000755 A	17-05-2000
		US 5864349 A	26-01-1999
EP 0992347 A	12-04-2000	JP 2000118005 A	25-04-2000
EP 0995603 A	26-04-2000	JP 2000118058 A	25-04-2000
EP 0616893 A	28-09-1994	JP 6278275 A	04-10-1994
		AT 180718 T	15-06-1999
		DE 69418755 D	08-07-1999
		DE 69418755 T	04-11-1999
		US 5966145 A	12-10-1999

EPO FORM P0459

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